



Ford S-Max Hybrid Uses Advanced Capstone MicroTurbine Power

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Langford Performance Engineering in Wellingborough, England, recently showed its Whisper Eco-Logic, a series, plug-in hybrid electric vehicle. The modified Ford S-Max crossover is fitted with a Capstone C30 MicroTurbine that serves as a range extender, playing a role similar to that of the small gasoline engine in the Chevy Volt, also a series plug-in hybrid vehicle. Langford will be marketing and demonstrating the plug-in hybrid vehicle with the goal of developing the concept with an automotive partner that could commercialize the product for the U.S.

The Whisper Eco-Logic can travel up to 40 miles on electric power alone and has demonstrated a top speed of up to 80 mpg in early testing. Along with power sourced from the electrical grid, the MicroTurbine's generator and regenerative braking keep the vehicle's lithium-ion batteries charged. Regenerative braking recoups 25 percent of the car's deceleration energy. Langford was able to integrate the MicroTurbine, power electronics, and batteries into the vehicle without compromising its seven-passenger seating or cargo capacity, or increasing overall vehicle weight.

Capstone's microturbines have only a single moving part and thus require very low maintenance. The single turbine/compressor shaft with its integrated generator rotates at 96,000 rpm and rides on patented air bearings that never require lubrication. Air cooling eliminates the need for a radiator, water pump, thermostat, hoses, belts, or external accessories.



While the Whisper is designed to run on diesel or biodiesel, Capstone MicroTurbines can operate on a wide range of fuels including natural gas, biogas, propane, and various forms of kerosene like JP4 jet fuel or JP5/JP8 military fuels. Natural gas is particularly attractive because of its widespread availability, relatively low cost, and low emissions.

Capstone MicroTurbines have been used in a large number of diverse applications. The company has sold some 4,000 MicroTurbine systems that have logged over 21 million operating hours. Applications include Secure Power systems to provide backup power for critical operations during grid outages; cogeneration for producing combined heat and power; and trigeneration, which provides cooling, heating, and power.

All these applications are based on one of the company's three basic building blocks – the C30, C65, and C200 MicroTurbine models. Their designations refer to rated electrical outputs of 30, 60 or 200 kilowatts, respectively. Capstone's newest and largest offering, the C1000 MicroTurbine Energy System, uses 50 C200 units to produce up to 10 megawatts of power. Designline ECO Saver IV hybrid electric urban transit buses using a C30 MicroTurbine in a series configuration are already in service in several cities including New York and Baltimore.





Performance is on the radar for certain applications, showcased by the installation of a C30 MicroTurbine in a Ford GT40 supercar. Turbine powered cars are not new. Chrysler built 50 of its 1963 turbine cars, a turbine-powered Rover BRM sports racing car ran at Le Mans in the mid '60s, and Parnelli Jones nearly won the Indianapolis 500 in a turbine car. A key difference is using a turbine in a series hybrid configuration to only charge batteries, overcoming two problems that plagued previous turbine powered cars – slow throttle response and high fuel consumption.

Along with another company, Capstone is developing an 'Eco-Pod' grid-independent, self-contained charging station for electric and plug-in hybrid vehicles. Running on clean natural gas, it could provide grid-independent charging to overcome grid overloading should plug-in electrics become widely popular. Stations could provide 480 volt charging without the need for expensive step-up transformers and would also be functional for recharging in remote locations.